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ABSTRACT

In response to today's concern for the environment and growing curricular demands to teach about the natural world, educators are discovering the power of a school's surrounding outdoors area as a teaching tool. This booklet presents an overview of educational landscapes and examines the pervasive attitudes and practices that have led to the undervaluing of the schoolyard environment, identifies specific steps to create successful educational landscapes, provides insights for integrating the schoolyard more fully into the school culture and pedagogy, and discusses how to sustain educational landscape programs over time. Examples of built educational landscapes from the United States and Britain are provided to illustrate the range of possibilities for school grounds. Appendices present a list of standards of learning opportunities related to the school grounds, ways to link school grounds with the curriculum, and students' wish lists for their school grounds. A list of resources concludes the document. (Contains 21 references.) (GR)

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EDUCATIONAL LANDSCAPES

Developing School Grounds as Learning Places

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Volume Three
in the Building Blocks to Better Learning Series

Published by:
Thomas Jefferson Center for Educational Design
University of Virginia

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Preface

This manual proposes that schools very well might look into their own backyards to discover the next frontier in school design. There is a quiet revolution occurring in this country and abroad as educators are realizing the role the environment around the school can play in education. In response to today's concern for the environment and growing curricular demands to teach about the natural world, educators are rediscovering that, in the words of an elementary school principal and school grounds advocate, "the outdoors is one great teaching classroom."

This booklet presents an overview of educational landscapes. It is intended primarily for use by school boards, school administrators, teachers, and educational policy makers interested in developing an educational agenda for their school grounds. Advocating an expanded role for school grounds, this booklet will examine pervasive attitudes and practices that have led to the undervaluing of the schoolyard environment, identify specific steps to create successful educational landscapes, provide insights for integrating the schoolyard more fully into the culture and pedagogy of the school, and discuss how to sustain educational landscape programs over time. Examples of built educational landscapes both in the United States and Britain will illustrate a range of possibilities for school grounds.

Undertaking an educational landscape is a long term commitment that should not be taken lightly. It will involve time and dedication not only to design and create it, but ultimately to make it meaningful and useful to the school community. However, there is a compelling and unarguable logic about re-valuing our school yards for educational purposes. Virginia's new *Standards of Learning* for example, mandates educating children about their natural environment through inquiry and discovery. Educational landscapes can support these instructional mandates with cost effective, on-site resources that enhance classroom learning through engaging, hands-on experiences.

Finally, schools that adopt educational programs where learning occurs indoors *and* outdoors will reinforce their status as leaders in the process of inculcating fundamental values of environmental stewardship. By facilitating our children's daily engagement with the outdoors, schools empower students with greater knowledge, familiarity, and skills, as well as a rich memory of landscape experiences. These abilities will be critically important as future generations face the urgent need to preserve local and global environments.

Thomas Jefferson Center for Educational Design

What will be the design and direction for the next generation of America's schools? This is the central question that lies at the heart of the Thomas Jefferson Center for Educational Design at the University of Virginia. Founded in 1996, the Center is comprised of faculty drawn from many schools within the University, including the Schools of Education and Architecture, as well as at-large associates from the school administration, business, and professional communities. In its mission to promote the design of better learning environments, the Center encourages the formation of partnerships with groups and school systems interested in creating new learning environments; provides opportunities for researchers and practitioners to share design ideas; and sponsors institutes, conferences, and symposia on design issues. This handbook is the third in a series of practical guides for educational planners.

The handbook is the product of a research grant funded by Thomas Jefferson Center in the spring of 1997. It is the outcome of a year-long study of school landscapes. The grant enabled me to travel to England where the theory of educational landscapes has been put into widespread practice through the work of a national organization called "Learning Through Landscapes". Since 1985, this charitable agency has had contact with more than 9,000 schools in the UK, promoting improvements to the educational use and quality of school grounds. It organizes seminars and training programs and acts in a design advisory capacity to support schools that seek to improve their grounds. Many of the projects referenced in this handbook were documented during my tour last spring.

I would like to express my appreciation to the Thomas Jefferson Center for the grant that supported this publication. Special thanks go to the Center's Director, Dan Duke, under whose thoughtful leadership was created this body of concerned and dedicated visionaries who have encouraged my research around this unsung, but compelling, issue of bettering the total school environment for our children.

Defining Educational Landscapes

1.

Imagine a school:

- *where going outdoors is not an exception to the rule...*
- *where going outside is more than a recess from classroom study...*
- *where teachers can immediately access natural resources and materials related to study units ongoing in the classroom...*
- *where students and teachers can step outside their classrooms to outdoor places designed for study, gathering, discussion, and play...*
- *where students can point with pride to projects they have participated in or a tree they have planted and tended.*

It is possible to realize these visions and more when a school embraces an educational landscape philosophy. The concept of educational landscapes completely redefines the role of the environment around the school building. It elevates the school grounds to full participation in the mission of education.

2.

Educational landscapes enable on-site resources to support the formal curriculum and promote effective hands-on experiences. They maximize the potential of school grounds by infusing them with multiple curricular agendas.

An educational landscape philosophy values going outside as a normal and healthy part of the daily school experience. The reason for going outside is not just to play or let off pent-up energy on the playgrounds. With a holistic approach to the total school environment, the activities of learning are actively programmed beyond the school's walls. Outdoor spaces that diversify and complement the indoor rooms are thoughtfully designed for teaching and gathering. Courtyards, gardens, groves, patios, pavilions, and trails designed hand-in-hand with the building fulfill a complementary relationship of building and site.

3.

Finally, educational landscapes allow each and every school to establish an individual identity of place. That identity can be sought in the community's cultural and architectural heritage or perhaps be based in the site's ecological essence. Finding such ways to reflect a locale or region can promote a more memorable and powerful sense of place and ensure that schools occupy a place of cultural and civic importance in the architectural fabric of the community.

School Grounds:
An Assessment of Current Conditions

4.

The Physical Form of Current School Grounds

Taking a critical look at today's school grounds can serve as a good point of departure in discussing their potential. The accompanying images were taken from several public school settings across the state of Virginia. They illustrate the all-too-familiar bland, desolate character of school grounds as we know them and reflect a sense of apathy toward the environment outside the school building.

The General Terrain (photographs 4, 5)

5.

The typical school grounds can be described as an exposed, flattened, treeless plane of grass and paving. The land is heavily engineered and leveled to meet the necessary but strictly utilitarian criteria for parking lots and ballfields occupying the site. The creation of this landscape can strike a heavy ecological blow to the character and quality of the vegetation, hydrology, and terrain that previously existed.

Furthering the problem of this engineered landscape is the tendency to design school buildings on one level. The consequence of this practice is the even greater need to clear expanses of land in order to accommodate sprawling building footprints. *Can the design of school sites work better toward the preservation and expression of the site's pre-existing ecology?*

6.

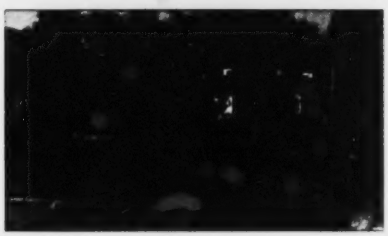
Relationship of Building to Site (6)

The school building typically dominates its surrounding landscape as an object at the center of the site. Immediately encircling the school building is a wide buffer of grass with occasional shrubs and trees. There is little activity programmed for this buffer zone, in spite of its proximity to the building, with the exception of playgrounds that must be located immediately off the classrooms for younger students. Conspicuous by their absence are places or features in this zone to accommodate teaching and gathering activities. Its only purpose, one would have to conclude, is to buffer the classrooms from the noise and activities of the outlying ballfields.

Activities inside and outside the building are segregated from one another. Easy flow between indoors and outdoors is thwarted by a lack of classroom doors to the exterior. The psychological and physical disconnection between in and out is heightened further by the lack of exterior doors along the main hallways. *How can the interface between inside and outside be better enlivened?*

Plantings on the Grounds (7, 8)

7.



8.

Whatever vegetation may have existed on the site prior to construction, for the most part, has been obliterated with extensive site grading. Generally only vestiges of natural vegetation remain along the peripheries of the site. In an attempt to remedy this over-exposed school yard landscape, trees and shrubs are typically distributed around the schoolyard. There is usually a noticeable cluster of plantings around doorways, entrance drop-offs, and parking lots. The role of these plantings is ambiguous, but seems for the most part utilitarian. Plants are used to screen out unsightly views of service areas and to provide shaded relief to a tree barren site. Beyond the utilitarian, plant design may be conceived as "landscaping." This terminology represents the limiting attitude that the purpose of plants on the school grounds is primarily for beautification and enhancement of the more important building. *Can there be a more substantial role for the plants on the school grounds?*

9.

10.

Programmatic Use of School Grounds (9, 10)

School grounds are, for the most part, under-used and under-programmed. Whether this stems from a lack of available places in the landscape or a lack of a definable teaching agenda attached to outdoor places, most schools do not engage their immediate surroundings. While equipment-filled playgrounds and play fields respond to recess needs and support many aspects of the physical education curriculum, the grounds are educationally valueless for other subjects. Other curriculum areas have not tapped the outdoors for opportunities that would engage the grounds and support study unit themes.

Finally, most schools find it impossible to program theatrical events, meetings, or social gatherings outside the building due to a lack of any appropriately sized and accommodating places. *What outdoor places and elements could support social and teaching activities?*

School Grounds Maintenance Policies

A final comment in this discussion of current attitudes about school grounds is the observation that an overall aesthetic of neatness and tidiness is stressed. At most schools, grass is mowed regularly, leaves are raked up immediately, shrubs are clipped into neatly shaped forms. This maintenance policy comes from long held and valid beliefs about community caring and schools as public institutions. It is important to note, however, that this is largely an adult viewpoint of how schools should look. It may not be a value held by most children. It is not responsive to the ways children are stimulated by and engage their environment. We must ask whether a policy of tidiness implicitly signals a hands-off orientation to the grounds, discouraging children from being participants and stewards in their own environment. *Could such a regimen of tidiness be signaling a hands-off policy toward the grounds, discouraging children as participants and stewards in their own environment?*

Current Attitudes About School Grounds

What attitudes do we communicate through our treatment of school grounds? Mostly we communicate our bias that a school is merely a building. The landscape remains passive and subordinate to the more important physical structure. The discontinuity of inside and outside signals the irrelevance of the outdoors to learning. Going outside, in fact, suggests a break from learning or a recess from teaching. Because of this prevailing attitude, one teacher alluded to the daily experience of schools as being "like prisons," where the children are "held captive indoors", only occasionally being allowed outdoors.

Educational Landscapes:
A New Agenda for School Grounds

11.

The following chapter outlines two new school grounds agendas, enabling places outside the building to complement and enhance the educational activities inside the building walls.

Agenda One: Educational Landscapes as Instructional Resources

Educational landscapes embrace the idea that many components of the curriculum can be taught outside. The selections and arrangements of trees and shrubs and the development of the surrounding natural environment can contain many lessons and themes. Such resources can reinforce and enhance classroom learning activities along integrated, multiple curricular lines. Most obviously are science curriculum units dealing with geology, ecology, and plant and animal kingdoms. These units can be supplemented with a diverse environment where flowers, plant community and habitats can be directly accessed and observed (11).

While science and environmental studies are the most obviously transferrable subjects, opportunities to use the schoolyard to teach language arts, fine arts, mathematics, and social studies also abound. (See *Appendix A "SOL Opportunities Related to the School Grounds*) for an extensive listing of educational standards, taken directly from the *Virginia Standards of Learning*, that are teachable through outdoor resources.) A rich landscape can become an immediately accessible subject for journal writing and art activities as students observe and record their environment and track its seasonal and monthly changes. Math units in patterns, counting, numbers, and measurements can become the basis for programming gardens and designing graphics on the walls and pavements around the school (12). Concepts of building construction and the mechanics of simple machines can be illustrated through the elements and structures in the playgrounds. Local cultural histories and practices studied in social studies can be recorded and expressed through the vernacular materials and building crafts used in detailing the building and gardens. Alphabet gardens and math gardens, where plants illustrate

12.

13.

This rendering of Swarthmore College successfully captures the spirit of a campus learning environment structured by its buildings and its plants. It is the plants and gardens that create the memorable experience of the campus. Reprinted by courtesy of the Scott Arboretum and Barbara Seymour of Landscapes (Moylan, Pennsylvania)

14.

letter and number concepts, also provide opportunities for children to engage and enjoy the outdoors through gardening. The opportunities for teaching through the landscape ultimately are limited only by our inventiveness and energy to create new teaching environments.

There are examples of teaching environments that have embraced the idea of a landscape as an instructional textbook. A notable example is Swarthmore College outside of Philadelphia. Here the entire campus is also an arboretum where plants indigenous to the mid-Atlantic region are collected and interpreted (13). Arranged by genus, collections of lilac, maple, crabapple, hollies and other species are grouped together amongst the buildings. They structure the campus landscape and allow for direct, informative comparison. In addition, all trees and shrubs are clearly labeled with printed tags, allowing for passive and guided interpretation by the academic community and arboretum visitors as well.

Of equal interest at Swarthmore College are the numerous gardens, borders, and plant displays that have been developed throughout the campus. Rather than being segregated from campus activity, these gardens are located at points where students will encounter them on their daily passages to and from classes. As a result, the academic community is encouraged to take a moment out of the day to enjoy and observe the seasonal and life cycle changes of plants in their environment. A cloister garden where students can sit and study contains plants with fragrant leaves and flowers (14). At the performing arts building, "winter interest" is the unifying theme of an entry garden whose plants feature colorful stems, unusual bark, berries, foliage and flowers enlivening the winter landscape. Students encounter daily a labeled rose garden which brings delight for five

15.

16.

17.

months a year through its exhibit of over 650 roses. Evergreen and deciduous plants that provide interest across all four seasons make up another teaching display in an entrance courtyard at the science building (15). Most of these gardens are interpreted with signs and printed brochures that tell about the plants contained within. By the simple decision to see the plants as a structured teaching collection, rather than as an arbitrary assortment, the College has enhanced its instructional programs.

Providing a very different, but equally engaging, approach to a teaching laboratory is the Le Conte Elementary School in Berkeley, California. Through a state-mandated program to teach enrichment in nontraditional ways, the school developed an active farm and garden program. The program's activities are focused on an interior courtyard situated at the heart of the school (16). An unused and barren void ten years ago, this space has been transformed into a child-friendly, engaging outdoor classroom containing a greenhouse, potting tables, animal pens, and vegetable gardens.

Every two weeks, Le Conte School students attend a gardening and farming class which is part of the required five-year curriculum. Each class plants, manages and tends its own gardening plot. The growth and life of farm animals is also part of the experience as children raise, feed and tend their own chickens, pigs and goats. Finally, the school organizes many of its major school-wide gatherings - a pumpkin harvest festival and a dinner meal of "stone soup", for example - around its gardening program (17). For students who come from urban neighborhoods with limited opportunities for daily contact with their natural environment, this garden fosters positive attitudes about stewardship, personal responsibility and ownership through its simple and direct farming lessons. In a later chapter, "*Making a Long Term Commitment to an Educational Landscape*," I will refer again to Le Conte Elementary School and ways that the school has coordinated its grounds program and its pedagogy.

18.

19.

20.

Preserving and diversifying on-site natural habitats and plant communities is another approach to taking advantage of the school grounds as an instructional textbook. Fields, stream beds, and forests provide rich subjects for field investigations and observations of animal, insect, and plant habitats. Today's prevailing school environments of mown lawns with their mono-culture of grass species provide only limited habitats for insects and animals. They are a sterile and unproductive subject for investigation. By preserving existing ecological habitats on site or restoring derelict habitats as part of the school grounds design, schools create invaluable hands-on teaching resources.

In England, wildlife ponds, wetlands, woodland, and meadow habitats are commonly incorporated features in many suburban schools. Schools design activities around these outdoor habitats to support instruction in sciences, fine arts, and creative writing.

On-site wetlands and ponds, whether artificially created or natural, provide an instructive and delightful teaching landscape that engages and delights children and supports the instructional program. Ponds are developed to be safely explored from wooden decks that are erected along the water's edge (18, 19). From these vantage points, students delight in pond-dipping, swooping their nets down into the water to collect frogs, fish, and insects and sampling buckets of pond water to test water quality. Most ponds are augmented by wetland or water-tolerant plant species that are planted around the edge for additional instructional opportunities. In the case of urban schools constrained by small sites and extensive paving, ponds are more typically raised above the ground with seating on the edge for observing fish and frogs, pond-dipping activities, or simply sitting (20).

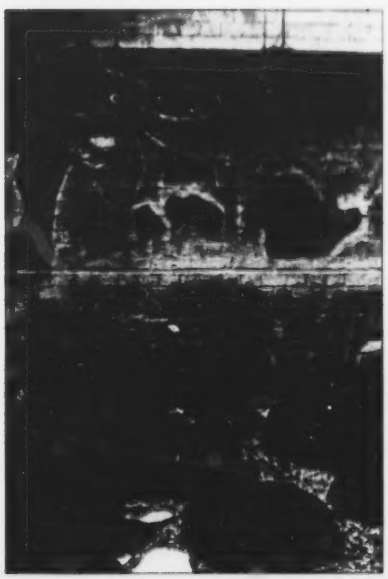
By recognizing the teaching possibilities of landscape, we start to view even the most common places in the schoolyard through new eyes. The edges of parking lots and school property boundaries have traditionally been neglected areas of school sites, serving merely as noise and visual buffering zones against neighboring properties. By transposing an educational mission program to all parts of the site, these leftover spaces can be developed as plant

21.

nurseries whose shade and flowering trees can be studied and compared. This drawing, by graduate landscape architecture students at the University of Virginia School of Architecture suggests planting a palette of meadow species, in the dry sunny islands of the parking lot as an instructive tool (21). In England, mulched and paved trail systems along these narrow perimeters are a common feature of schools (22). This was especially true of urban schools where small sites demanded optimal use of every available square foot of land.

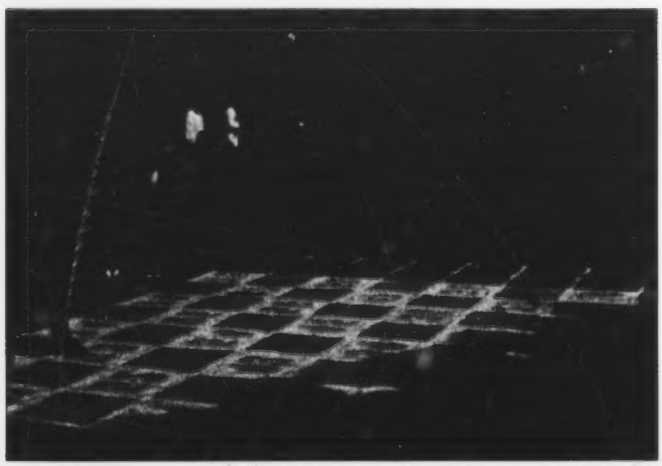
22.

Teaching missions also can be served in the most banal places, such as the concrete and asphalt surfaces on which students walk and bounce balls. English schools provide a host of examples where large, asphalt pavements, buildings, and ball-hitting walls are transformed with colorful painted or mosaic murals (23). Bold graphics on surfaces become places where children create their own games out of large colorful numbers and letters (24).



23.

Even the parking lot can be turned into a laboratory for teaching about hydrology and ground water quality as part of the earth sciences curriculum. Schools have the opportunity to become model sites where alternative and innovative techniques for storm water management are implemented, interpreted and demonstrated to students and the community at large.



24.

Agenda Two: Educational Landscapes As Outdoor Classrooms

It is probably often the case that when a teacher wants to enjoy a beautiful day outdoors with a class, he or she does so despite the lack of consciously designed gathering places. School grounds suffer from a lack of places that are suitably designed and adequately protected from obtrusive views, noises and overexposure to sunlight. As a result, sidewalks, driveways, curbs and stairs become sites by default for picnic lunches, student-teacher meetings, and class activities. Larger scale activities such as graduation ceremonies, all-school meetings, and theatrical performances are limited as well by the lack of well-conceived and accommodating places outdoors.

If we embrace a concept of learning environments as more than just buildings, our vision of schools expands to include garden rooms, terraces, courts, lawns, tree groves, screened porches, pavilions and gazebos. Each of these outdoor rooms should be carefully considered for use. Just as classrooms would be inconceivable without desks and chairs, picnic tables, lawn chairs, benches, and other site furnishings should be selected for the types of activities and group sizes to be accommodated outdoors.

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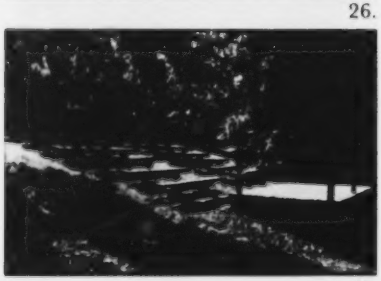


27.

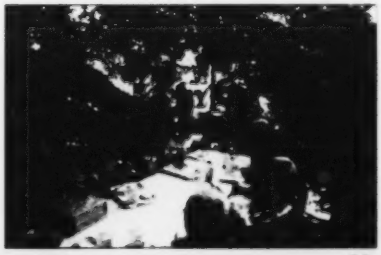
Amphitheaters make unique and powerful settings for the ceremonial and everyday life of the school. They provide an alternative to the mundane gymnasiums and cafeterias that are the usual sites for graduation and performance productions. The garden amphitheater at the State Arboretum of Virginia, which is part of the University of Virginia, provides many opportunities for festivals, music performances and large group meetings (25). In quieter moments when the amphitheater is not in use, a small circle of tiered grass ledges near the stage provides a comfortable classroom for informal discussions and lectures. As another example, the beautiful sylvan amphitheater at Swarthmore College, with its simple palette of trees and grass terraces, provides a memorable setting for graduation exercises each spring (26). While these two amphitheaters are remarkable examples, it is important to note that such settings need not be expensive and elaborate. Even this modest construction at a local elementary school (27) can engage the school community in a celebration of the theater experience in the natural environment.

28.

While large group amphitheaters provide important and memorable places for grander school events, less formal places around the grounds are vital to the day-to-day school experiences of children. It is easy to imagine many possible outdoor rooms that could support the school community's daily activities. A sheltered reading garden with benches and nooks for reading can be a complement to any school library, providing quiet and intimate places for children to nestle with a book (29). Storytelling circles can also be accommodated with comfortable seating and a place from which to address listeners (28).

The design of gathering places should recognize the physical differences between children and adults and the possibilities of different group sizes (30, 31, 32). A good design should accommodate the different needs of a "thirty-minute" seat meant for longer sittings and a seat at the school entrance where children pause briefly to be picked up. A bench on a playground might creatively serve two roles as a place for rest or study for older children and a playful, climbing object for younger children.

29.



30.

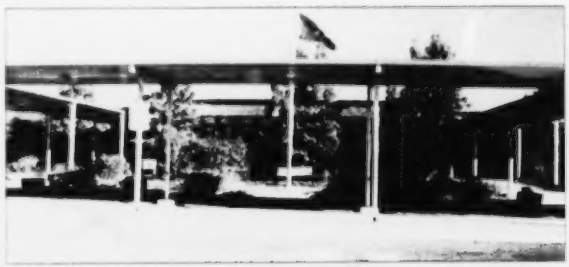
31.

32.

33.

34.

Drop offs at the front of schools present another often overlooked opportunity for developing rich and engaging places. At the Coombes Infant School, outside of London, a paved terrace with benches, an above-ground fish pond, picnic table, and plantings greet students upon arrival (33). This celebration of the school's threshold not only creates an informal teaching place for hands-on fun and exploration, but also an accommodating and engaging place for children to assemble at the end of the day. At another urban London school entrance, children enter the school grounds from the street through a small courtyard shaded with an overhead wood trellis (34). This structure, covered with vines and vegetables grown from planter pots at the base of the trellis, provides shade to tables beneath and serves additionally as an educational tool for the study of plants. At Walton Middle School, south of Charlottesville, Virginia, the school community decided to locate their butterfly habitat garden prominently at the school's main entrance and bus drop off, rather than relegate it to a more remote location (35). The seating and colorful array of plants enliven the sense of arrival and create a pleasing and useful place for the school.

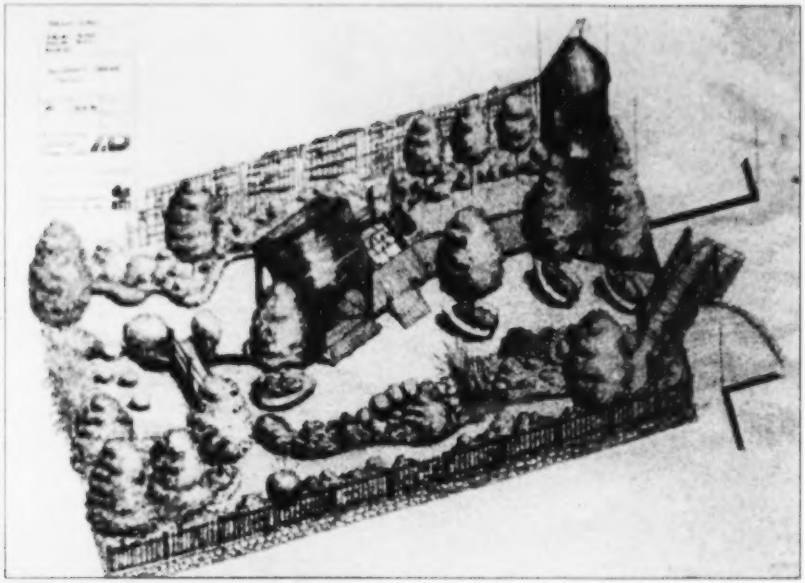


35.

36.

37.

The Raglan Primary School near London has embraced the mission to create memorable "rooms" for outdoor gathering and teaching. Over a ten-year period this school has literally dug its way out of a pre-existing landscape of solid asphalt (36). Working with a professional architect, the school developed an ambitious set of garden rooms, each with distinct character and purpose. In one of these garden rooms, children sit on, stand on, and jump atop colorful painted logs in an imaginary world of play (37). The logs are arranged to create areas for small groups to cluster, talk and play. In time the garden's trees and shrubs, all of which are identified with plant labels, will make this outdoor room a shaded haven from the adjacent bustling playground.



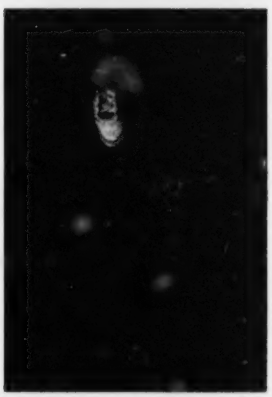
38.

Also reclaimed from the asphalt at the Raglan School is this Kentish Riverbank Garden, used by the classes for reading and storytelling periods (38). Designed by Andrew Scott, RIBA, of ABP Chartered Architects (Bromley, Kent), this fenced-in stroll garden features paths and plants arranged around a winding cobbled pavement representing the local Kent River.

The garden contains scaled down wood boats as seats and child-sized vernacular farm structures (barns, stables, etc.) as reading pavilions (39). Delightful clay sculptures of local fish species, made by the children in art class, are laid into the cobbled river bed floor (40).

39.

All the plants in the perennial border are identified and labeled for interpretation. The attention given to small details in this children's garden is notable. The plants, cobbles, sculptures, and architectural details are vital components that will continue to delight and engage on a rich tactile and visual level each time they are discovered.



40.

These are just a few examples of how the value of school grounds can be upgraded when they are designed as outdoor classrooms and instructional resources. It should be stressed that there is no formulaic solution for the broad spectrum of schools. Each school must analyze its own teaching requirements and unique physical and socio-cultural identity to determine what outdoor places and resources would best serve its learning community. In the next chapter, a new architectural design process for schools will be offered as a way to better insure the implementation of these agendas.

Preparing to Design an Educational Landscape

The decision to undertake an educational landscape has significant implications for the process by which schools are designed. In this chapter, a model is offered for a new and expanded architectural design team whose participants will raise important issues about the site and its role in the educational program. A comprehensive educational landscape plan calls for a new type of design drawing and is highly recommended as a tool for creating school grounds as a teaching resource and as a classroom.

A New Design Team

Depending on the nature of the project and site, selective additions of site-related consultants to the architectural design team can be essential. Landscape architects, ecologists, hydrologists, geologists, arborists, and naturalists can make important contributions by addressing ecological aspects of the school site. Their expertise provides vital input about the natural systems of the site and region, information which can fundamentally impact the initial conception of how the site is developed. For example, arborists can assess the condition of existing trees or wooded areas and recommend how to minimize impact to valuable identified areas and plants. Hydrologists can offer storm water management strategies and techniques to reduce runoff sources and develop filtration techniques to cleanse and detain water. Able to value the site itself as part of the whole program for the school, a multi-disciplinary design team can reveal valuable data about the site and establish an optimal, ecologically defensible approach to building on it.

The design team should collaborate from the start of the project in order to integrate site and building concerns into a unified plan. It should be required to produce drawings that relate the interior hallway and room plans of the building to the context of the surrounding site. Such combined information allows planners and the school community to see complementary rooms and spaces across the exterior building walls and envision the flow of movement between inside and out.

If a specific program for the exterior does not exist, part of the contracted role of the team could be to help the school articulate a statement of goals and a mission related to the school site. That set of goals, elicited from the faculty, administration, students, and parents, would set the direction for grounds development and site amenities that support the outlined goals.

The Educational Landscape Master Plan

Developing an educational plan that includes both the building *and* the site is critical for achieving a coordinated vision for a total learning environment. A master plan for an educational landscape is not just a site plan or a landscaping plan. It envisions the use and physical form of the total learning environment in its relationship to the building to support an educational mission. Expectations should go beyond ballfields, playgrounds, parking lots, and drop-off areas. The plan should represent the outdoor spaces tailored to suit a variety of teaching activities. Preliminary designs for the character, form, and sizes of spaces, as well as site furnishings and elements, should be laid out.

Optimally, the educational landscape master plan should evolve early on and simultaneously with the planning of the building. Postponing landscape design until *after* the building is designed -- or worse, already built -- reduces the possibilities for the site to influence the building outcome and eliminates the opportunity for subtle building changes that could greatly improve the relationship between building and site.

A master educational plan lays out a long-term vision. It is especially helpful when the planned facilities cannot be built all at one time, as is often the case for schools. The design study might suggest phasing strategies for implementing portions of the work over time. A plan will help determine which infrastructure requirements -- water and utility sources, major site grading, and heavy pavement and wall construction -- are most economically and logically constructed as part of the initial construction when construction machinery is on site. After that, the master plan serves as an excellent guide

to assure that subsequent installations will not have to be torn out, but will fit into a larger long range facilities and maintenance plan.

There is no formulaic solution for an educational landscape master plan. Each design should be a reflection of the unique physical assets and characteristics of the school site, the philosophy and mission of the school, curricular goals, the school programs and culture, and finally resource and budgetary limits.

The following two master plans, both produced by professional landscape architects in consultation with the school communities, have been included to suggest a range of possible design outcomes.

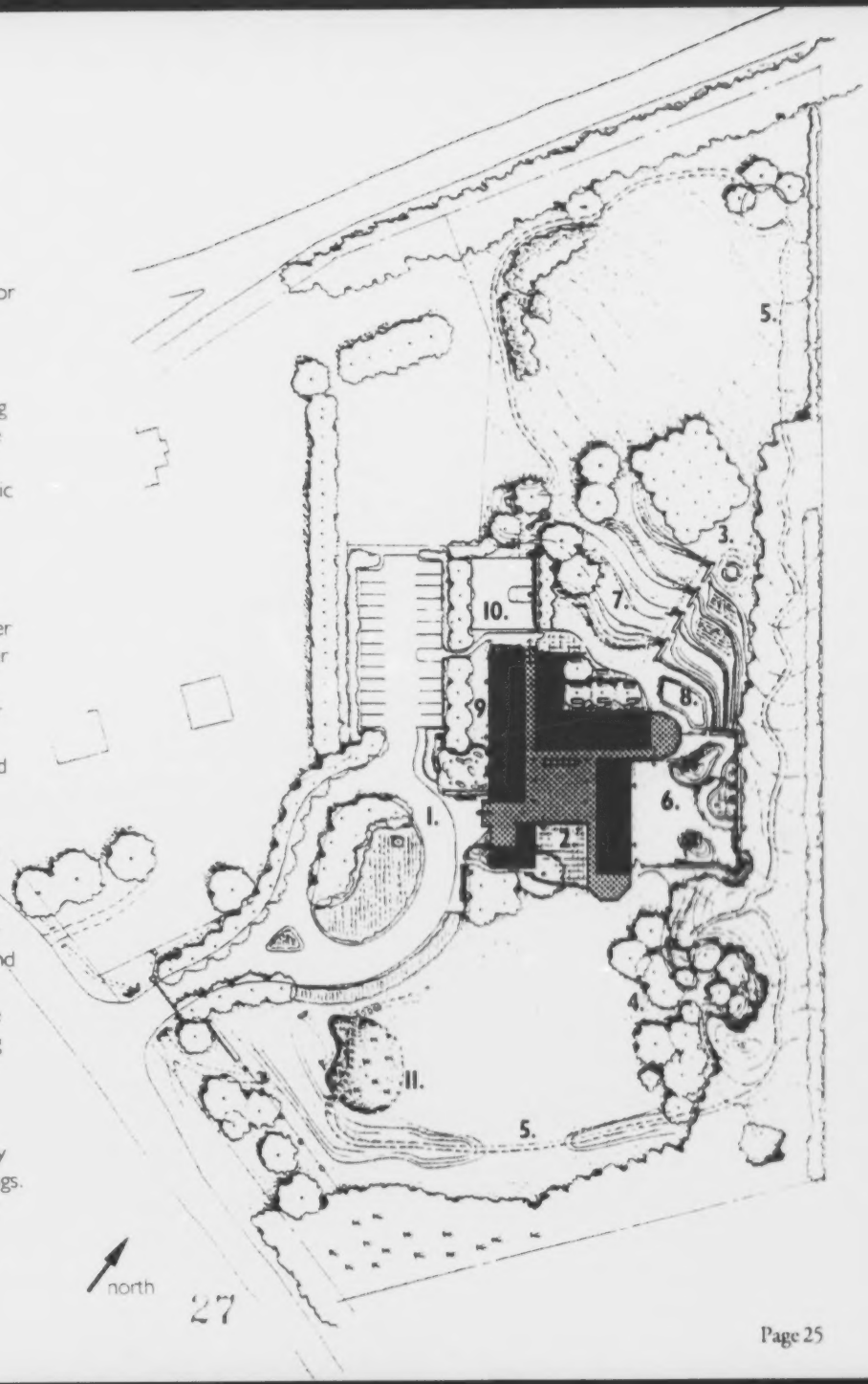
The first plan is currently in the design development stages by the author for the Princeton Junior School, a small pre-K through 5th grade private school in Princeton, New Jersey. A variety of teaching and gathering places are envisioned to take advantage of the unusual asset of its large property and to express the varied character of the landscape. In the dry, upland meadow portion of the site, a sunny sky garden gives places for students to engage in terrace gardening, orchards and weather station activities. In contrast, a cove garden by the wooded wetlands and detention basin features a shaded reading garden for classes set amongst a demonstration of wetland habitat plants.

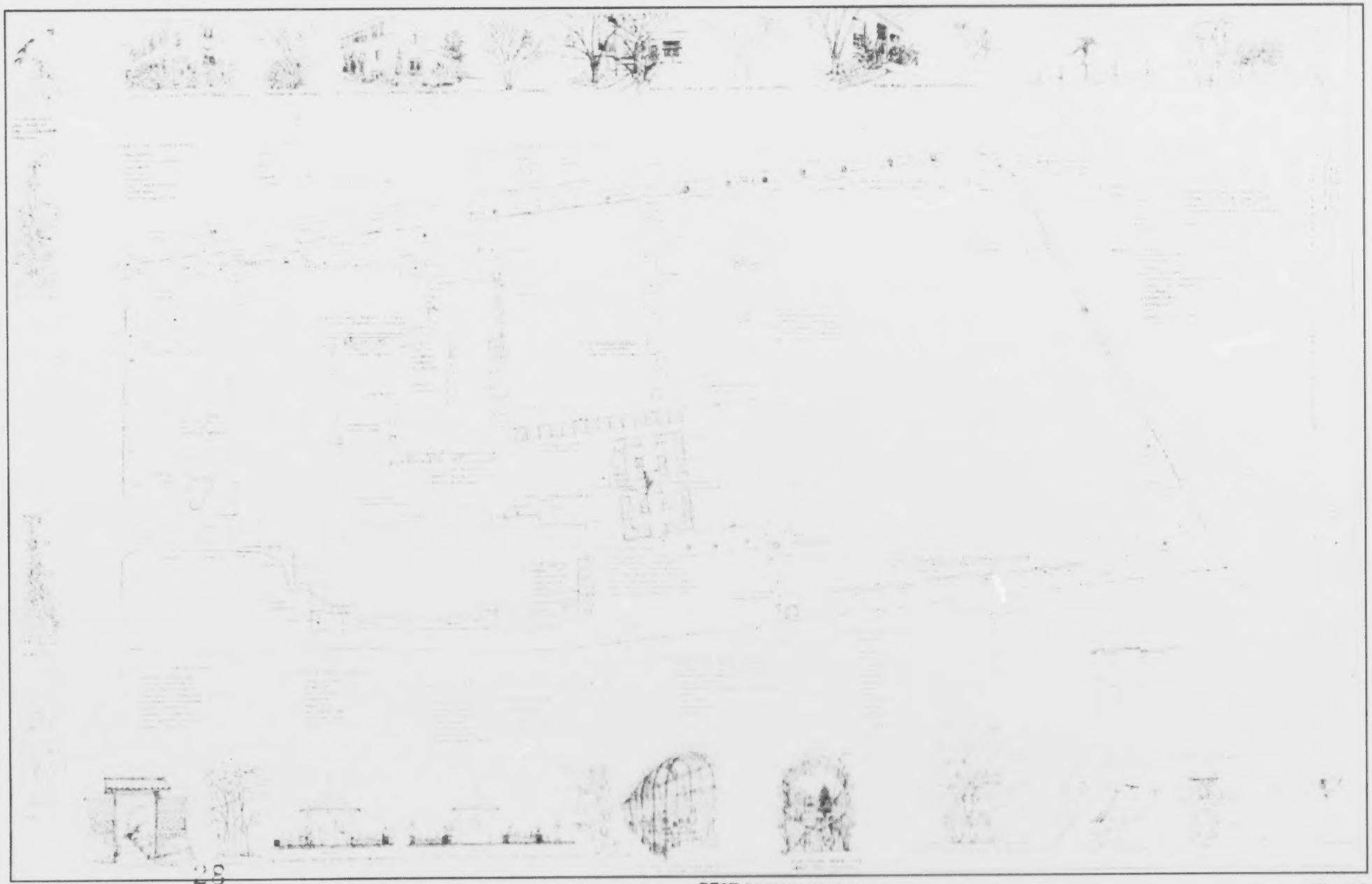
The second fold-out plan developed for the Swarthmore Rutledge Elementary School in Swarthmore, Pennsylvania by Landscape Architect, Barbara Seymour, seeks to reestablish gardens and plants on this small urban site that is dominated by existing paved courts and playfields. This design for a "Habitat Adventure Project" creatively utilizes all margins and in-between places on this site with a wide range of habitat theme gardens and a ropes course area to create engaging places for the students and community throughout the year. More is written about the Rutledge School and how the school administers this program later in the book.

Princeton Junior School

Prnceton, New Jersey
Preliminary Educational Landscape Plan for
Teaching Elements and Places
Fall, 1998

1. *Entry Drop Off:* with plantings, seating walls and sculpture to enhance the sense of arrival.
2. *Commons Courtyard:* develop a public gathering place around an educational theme of plants with views out to the wooded wetlands.
3. *Sky Garden and Meadow Classroom:* featuring an earth mount, sky and weather station, and sundial for observing weather patterns.
4. *Reading Cove and Wetlands Outdoor Classroom:* featuring a shaded reading garden amongst native woodland wetland species.
5. *Circuit Path* around the school perimeter developed in conjunction with different plant communities.
6. *Playground* for the lower age grades with vine-covered shelter, shallow water play basin, and sculptural land mounds and sand pits.
7. *Terraced Gardens* for classes to raise vegetables and flowers adjacent to eating terrace with picnic tables.
8. *Outdoor Amphitheater* off music room.
9. *Library Reading Garden* off the library with boulders as seats under tree plantings.
10. *Paved Playcourt* with seating wall for upper grades.
11. Interpretive demonstration wetland plantings around the detention basin.





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Design Considerations for an Educational Landscape

A critical step in the design of an educational landscape is challenging preconceived notions about what school grounds should look like. In this section, several alternative models to the conventional image and form of school grounds will be discussed. Recommendations based on the desires of children as well as mandated curricula will also be offered as bases for designing and programming school grounds.

Moving Beyond A Building-Centered Concept of School

Is it possible that the heart of a school may be found in the landscape rather than in the building or an interior space? Central to the concept of an educational landscape is a critical shift away from a singular focus on the building. With a holistic view of the site, schools can be organized around a scheme whose heart may actually be a tree, a courtyard, a village green, or perhaps a forest grove or other remnant of the site's original landscape. Such places can easily become the memorable landmark for a school and the location for many annual celebrations, all-school assemblies, and daily activities.

With the shift in orientation from being only inside during the course of a school day, the arrangements of doors and windows become a critical architectural design issue. Classroom exterior doors, which allow for spontaneous and unimpeded movement to outdoor study and work spaces, should become standard features, when practical. Hallways should be designed with natural lighting and windows should allow opportunities to view the outside and get a sense of place.

Large sheltered pavilions and covered porches attached to buildings should be considered for the design of new schools. They offer a new type of teaching space that shelters class activities from the elements and makes use of the outdoors possible during drizzly days and unpleasantly hot weather.

Similarly arcaded exterior passageways can offer alternative ways of circulating around the school and allow the community brief moments of fresh air during the daily transition between class periods.

Linking School Grounds to the Curriculum

In the long run, the success of a teaching landscape depends on supporting, rather than adding to, the heavy demands placed on teachers to cover mandated material. Specifying tangible and direct links between the school grounds and mandated study units is a valuable and important step. Teachers are encouraged to use the grounds when outdoor activities service their teaching goals in engaging and hands-on ways. Schools can also employ mandated curriculum units to leverage the types of gardens and facilities they will build.

An increasing number of schools have recognized the value of connecting curriculum to the school grounds. Kings Copse Primary School in Southampton, England, planned its teaching program in conjunction with an extensive educational landscape. Begun in 1975, the ten-acre school landscape now has richly developed trails winding through wetland, meadow, orchard and woodland habitats, a sheep raising operation, and an extensive gardening and tree planting program.

To optimize the use of these facilities, teachers and administrators mapped a five-year teaching curriculum summarized in a document called their "Topics Matrix". The following page is from the "Topics Matrix" for grades K-1, which specifies required study units in every subject for each grade level and then explains how and when the grounds should be used to link with the material (referred to as "Grounds Opportunities"). Teachers thus are encouraged and supported to take advantage of their extensive grounds. Through this systematic organization, a student is guaranteed to have an ongoing connection with the grounds as part of his or her experience at the school.

(Page from the "Topics Matrix" at Kings Copse Primary School, Hedge End, England)

Science **

Life Processes and Living Things
Pupils should be taught:

1. Life Processes
   a. The differences between things that are living and things that have never been alive.
   b. That animals, including humans, move, feed, grow, use their senses and reproduce.

2. Green Plants as Organisms
   a. That plants need light and water to grow;
   b. To recognize and name the leaf, flower, stem and root of flowering plants;
   c. That flowering plants grow and produce seeds which, in turn, produce new plants.

3. Variation and Classification
   a. That living things can be grouped according to observable similarities and differences.

Grounds Opportunities

R.E.

KS1 - Similarity / Difference

Places of Worship

Visit local church + one other

How do people worship ?

Why ?

Geography

Locality: Norwood School, Eastleigh (Park, Etc.) Places
1. In these studies, pupils should be taught:
   a. about the main physical and human features, e.g. rivers, hills, factories, shops, that give the localities their character;
   b. how localities may be similar and how they may differ, e.g. both areas may have farmland, but animals may be kept on the farms in one area, while in the other crops may be grown;
   c. about the effects of weather on people and their surroundings, e.g. the effect of seasonal variations in temperature on the clothes people wear;
   d. how land and buildings are used, e.g., farms, parks, factories, houses

Thematic Study
1. The quality of the environment in any locality, either in the United Kingdom or overseas should be investigated. In this study, pupils should be taught:
   a. to express views on the attractive and unattractive features, e.g. tidiness, noise, of the environment concerned, e.g. a play area, a street, a woodland;
   b. how that environment is changing, e.g. increasing traffic;
   c. how the quality of that environment can be sustained and improved, e.g. creating cycle lanes, excluding cars from an area

Grounds Opportunities

History - Locality: Norwood School, Eastleigh

Areas of Study

1. Pupils should be taught about the everyday life, work, leisure and culture of men, women and children in the past, e.g. clothes, diet, everyday objects, houses, shops and other buildings, jobs, transport, entertainment. In progressing from familiar situations to those more distant in time and place, pupils should be given opportunities to investigate:
   a. changes in their own lives and those of their family or adults around them
   b. aspects of the way of life of people in Britain in the past beyond living memory.

2. Pupils should be taught about the lives of different kinds of famous men and women, including personalities drawn from British history, e.g. rulers, saints, artists, engineers, explorers, inventors, pioneers.

3.* Pupils should be taught about past events of different types, including events from the history of Britain, e.g. notable local and national events, events in other countries, events that have been remembered and commemorated by succeeding generations, such as centenaries, religious festivals, anniversaries, the Gunpowder Plot, the Olympic Games.

The East Haven School District in Connecticut also recognized the value of connecting its school grounds development with its teaching curriculum when a 1997 planning study of eight schools was conducted. In response to the neglected and underutilized playgrounds, the district Superintendent's office sponsored several workshops to develop schematic landscape designs for each school with the aim of teaching greater eco-literacy and environmental stewardship to students.

The workshops, which involved school administrators, local school steering committees and students, were led by Anne Taylor Associates, noted school design consultants from Albuquerque, New Mexico. Ms. Taylor, also Director of the Institute for Environmental Education at the University of New Mexico, is an authority on the design of learning environments.

The process yielded an educational landscape master plan for each school calling for site specific elements such as orchards, weather stations, vegetable gardens, and compost bins. These amenities were then tied into a package of twenty lesson plans called "learning landscape experiences", also developed as a part of this study. Each "learning experience" - such as the one included in the Appendix for building a straw bale and redworm compost pile - concludes with a listing of the various mandated District Science Standards addressed by that particular activity. Through this design process, the link is successfully forged between the district's eco-literacy teaching mission, science standards curriculum, and the school grounds environment, facilitating and validating its use by teachers.

Seeking an Evocative and Memorable Landscape Identity

School landscapes can suffer not only from a lack of a teaching agenda, but from their inability to evoke any sense of identity. The standard, heavily engineered site program of ballfields, playgrounds, and parking lots marks school grounds across the country with a disturbingly generic sameness. William Bradley, former Assistant Director of the Thomas Jefferson Center for Educational Design,

speaks of the problem of "placeless-ness" that plagues many school environments. He argues that each school design should create a "spirit of place" that evolves from regional, cultural, and natural contexts, thereby reminding school communities of their unique heritages.

Using the Natural Ecology of Region and Site

Taking advantage of natural systems and habitats on school sites for instructional purposes was addressed earlier in this booklet. In addition, however, woodlands, meadows, streams, and wetlands can offer wonderful design opportunities for creating a specific and memorable identity for a school. Preserving and enhancing these natural site amenities can offer new directions for the design of schools and challenge the convention of sterile, mowed-lawn environments.

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An interesting case in point is the campus for the Barrington Prairie Middle School in Illinois (41). Faced with high real estate costs, the city purchased a degraded wetlands site for this new school because the land was inexpensive, and it was adjacent to a recreational park whose ball fields and facilities could be shared.

One of the mandates for building the school in the silted wetlands was to restore and expand the surrounding native wetlands and prairie. Steven Apfelbaum, a consulting ecologist whose Wisconsin-based firm, *Applied Ecological Services*, specializes in a range of ecological restoration and environmental education projects, served on the design team. Apfelbaum looked at balancing the conflicting needs of the building, roads, and parking lots with the natural aspects of the site. The ecologist's influence in the design is evident upon first entering the school site, as the entrance road winds through the wetlands (42). Classrooms overlook the restored prairie and wetlands through which the children pass daily on their way to the playing fields (43).

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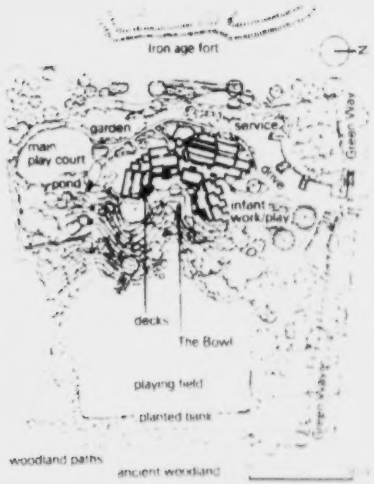
The case of Barrington Prairie Middle School challenges the criteria by which potential school sites are evaluated. Should sites that present minimal impediments to building be rated higher than challenging and degraded sites? In the case of Barrington, a win-win situation was created for both the environment and the school. The project succeeded in improving the wetlands while providing the school with a rich teaching resource. As the availability of undisturbed, large-acreage sites for new schools diminishes, less desirable sites may be the next frontier. Abandoned or heavily disturbed sites such as landfills, old industrial sites, quarries, and wetlands may provide the means for instilling quality of place and identity for schools and teaching valuable lessons to students about the interaction between humans and their environment.

Adopting Regional Vernacular Models

Another way for schools to avoid the generic look that plagues campuses is to draw upon specific vernacular traditions and regional cultural histories. There are successful examples of schools whose design has been modeled upon the rich local architectural heritage of houses and gardens, farm complexes, and villages and towns (44). By adopting these "other" models of design, the architectural designers of the schools have sought to break away from the conventional look of schools and create a fresh and meaningful identity.

Many schools have successfully fashioned their landscape around the form of house and garden, expressing an underlying philosophy of a supportive home-like atmosphere at school. The Tandem Friends School, established in 1970 in Charlottesville, Virginia is built around an historic, three-story antebellum house, gardens, and outbuildings. New structures continue to build upon the identity of this traditional agrarian arrangement, as suggested in this rendering by graduate student Kate Davidson, as part of a design studio led by James Klein in 1991 (45). Throughout the day students enjoy an atmosphere of security and freedom, switching classes from building to building, studying, playing, and sitting in the meditation garden and the various lawns. The campus is a direct physical manifestation of the school's guiding philosophy, which grants students freedom with responsibility and focuses on the spiritual life of the child.



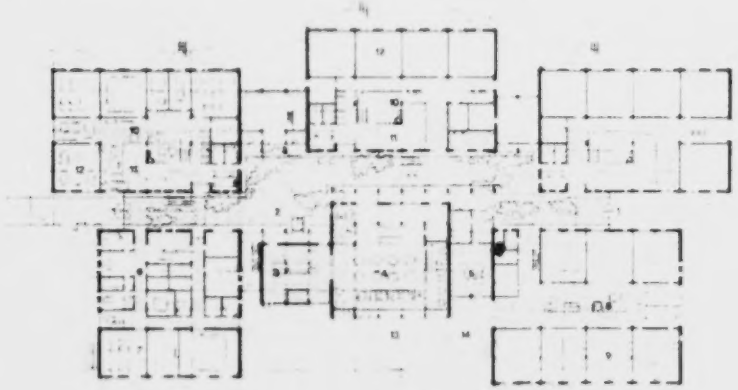
46.

Reprinted with permission from the article featuring the school in Architect's Journal (June 3, 1992) See Appendix.

The Woodlea Primary School in Hampshire, England, is a recognized school design because of the way its organization and character are modeled after that of a village settlement. The design team, comprised of Architects Nev Churcher and Sally Daniels and Landscape Architects Pirkko Higson and Stuart Pearson, created an informal cluster of separate buildings, rather than one large structure. The overall impression is of a series of small houses arranged around a larger town hall. The design has been heralded because of its success in preserving the sylvan bowl setting in which the school sits (46).

Examining Models of Landscape Design

How might a school environment look, if we were to imagine it as an arboretum? a street? a park? Another way to break out of the conventional mold is to consider other models of landscape design. An earlier chapter described how the Swarthmore College campus was transformed by its "other" identity as a public arboretum. There, plants and their display are elevated to greater importance, creating an important structuring device and memorable design component for the campus.



47.

Images 47 and 48 reprinted from Architectural Review, (July - December 1982). See Appendix. Courtesy of Nohr and Sigsgaard, Architects.

48.

The architectural firm Nohr and Sigsgaard in Copenhagen, Denmark borrowed the urban street model for the design of Sonderborg High School in Sonderborg, Denmark. The school is arranged as a linear internalized street with teaching spaces that line the corridor-like houses in a small city (47). The central corridor through the school, filled with trees and

tables, serving as a place for social encounters, sitting and study. Natural lighting from high, double story glass roofs creates a sense of the spacious outdoors brought into the building (48).

The design of American universities in the early twentieth century provides another interesting and compelling example of how school grounds can gain a memorable identity. Paul Venable Turner in his book Campus: An American Tradition writes about this period when many universities, including Yale University and Trinity College in Hartford, Connecticut, were fashioned around the idea of the medieval monastery. The monastic model was borrowed because it engendered the positive ideal of a learning community. Architects and educators appropriated the known architectural form of the monastery with its inner garden quadrangle, enclosed on all sides by buildings, to foster a sense of protection and seclusion.

Rethinking Expectations

Many people are accustomed to neat and orderly school environments. Carefully manicured lawns and trimmed shrubs reflect the way in which our society values its public institutions. But have we considered whether or not these well-tended landscapes create meaningful learning environments for children? Do they address their needs and desires?

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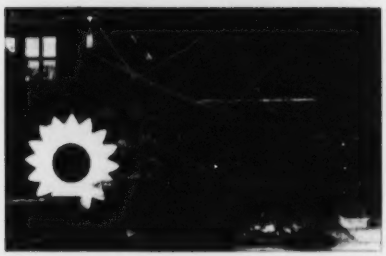

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Liz Russell, an English landscape architect who researches and writes about school grounds, describes the sometimes conflicting relationship between good landscape architectural design and design that is good for education. "School grounds should be designed for education even if being educational reduces their aesthetic appeal. Does the restrained use of materials on the site, which has resulted in an aesthetically-pleasing environment to an adult, provide the best educational resource for the school or the most stimulating and imaginative environment for the children? How do we balance the desire for an aesthetically pleasing and acceptable design in the eyes of an adult with a stimulating and imaginative environment for the children?" (From the article "Designing for Diversity," Landscape Design. See Appendix.)

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It may be possible to balance schools' needs and the public's needs for good design if we can agree that high-maintenance mowed lawn landscapes do not have to prevail uniformly over all parts of the grounds. Can we accept some areas of the grounds as natural and less tended (51)?

Opportunities to produce richer and more diversified places for learning may be an outcome of relaxing our standards for neatness. We may even gain efficiency and cost savings through a revised grounds maintenance program. Revised maintenance practices might include not raking fallen tree leaves in order to enrich animal habitats, or leaving fallen tree trunks in place for children to explore insect nesting sites and observe nature's decaying process (52).

English schools offer another stepped-down maintenance strategy that can help us reconsider our grounds standards. Meadow habitats are commonly left to grow up around the edges of mowed grass play fields. Rather than cutting the grass in these peripheral areas, taller grass, trees, and shrub species are allowed to emerge and thrive, being bush-hogged annually or being left to return to a wooded state. The natural meadow edges serve as rich teaching labs and home for birds, wildflowers, and butterflies (53).

Incorporating the Perspective and Desires of Children

Providing For a Fuller Range of Forms of Play. Asking children what they want in their school environments is a critical step toward eliciting interesting ideas that challenge the status quo of today's school grounds. We are all familiar by now with the giant, manufactured play equipment structures that rise out of a mulched ground surface and dominate the current American school playground. No doubt children are attracted to these colorful and elaborate structures that aid in the development of their social interaction and gross motor skills. But how we can expand our view of play and offer more diversity in play settings?

Interestingly, very few school grounds in England contain these kinds of manufactured play structures. The high price tag of this

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These images were done by school children at Sandfields Primary School as part of the design process for their school grounds. Done as a part of the art activities, these drawings yield insights into children's desires for learning places.

equipment may explain, in part, its absence. However, when asked about the lack of such structures, teachers explain their bias against this equipment, which they feel accommodates active play successfully but limits children's imaginative and creative play.

The following wish list was elicited from students, parents and teachers of a primary school in London. It was drawn up as part of the process for designing their new schoolyard. The list includes a breadth of equipment for active play, including popular active equipment pieces like climbers, monkey bars, slides, and swings. A further look into the list reveals a host of imaginative play rooms and elements: shady caves, dream houses, peaceful places, play huts, and theater stages. Schools should consider how these alternative play forms, which cannot be accommodated by today's standard climbing structures, can be incorporated into their landscape designs.

Wish list from Abigail in third level, age seven

An adventure house for when it rains / a place where you can rest and have a drink / a place where everyone can play card games / a place where the teachers can have fun / a place where you can swing / a football pitch with goal nets / a place where you can hide with tunnels / a place where you can grow things / a place where you can have a snooze / a place where you can climb / a place where you can read and write / an underground house / a place where you can paint / a shark tunnel where you can see the inside of a shark / a place where there is sculpture / a place where you can think / a place where you can step into a book / a place where you can see nature / a place where you can do some clay making.

Appendix C: "Students' Wish Lists for their School Grounds" contains examples of other wish lists drawn up by schools as they embarked on the process of designing their educational landscape.

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Providing For Flexible and Experimental Environments. In her book Landscapes for Learning, Sharon Stine explains the difference between the way that the teacher and the student view and engage their environment. "Passive visual experience does not match a child's active way of being in the world. The child seeks direct sensory stimuli, especially in the out-of doors. It is through body contact, direct and often disorderly, that children need to experience their world. The adult-avoided mud puddle is a place to experiment with splashing. The adult's vista of a lush green hillside is for a child a place to roll down, feel the wet soft grass, smell its green smell, experience the free fall of tumbling round and round. The outside space for adults is typically dominated by the clean beauty of the visual, not the messy disorder of mud and wet grass. Children as players in the environment are 'place-messers'...."

Stine's observations point to the need to provide environments that are changeable, experimental, and even messy in the hands of an active child. Environments in which children can dig, roll, pile, and slide connect with the way children want to experiment with and shape their world. Unlike playground equipment with fixed components and limited activities, a pile of logs, twigs, shovels, bricks, and mud provides for endless creative expression through building, tearing down and rebuilding. Schools should allow for a degree of place-messing on grounds or perhaps set aside specific areas for 'place-messers' to be active participants in the physical environment. Such allowances can help develop a child's environmental understanding and stewardship by creating opportunities to engage the environment and observe the direct effects of their actions on the world around them (56, 57, 58).

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Making a Long-Term Commitment to an Educational Landscape

Maintaining a Viable Educational Landscape Over Time

While the idea of educational landscapes is compelling in so many ways, it is important to note that there are pitfalls. Research has revealed clearly that one of the biggest challenges is the long-term viability of school grounds facilities. It is relatively easy to find start-up funding to install school gardens and amenities and to garner great initial enthusiasm for these installations. However, several factors, including the lack of an ongoing maintenance program and a lagging commitment by the faculty to using these resources, can threaten the continuation and growth of school landscapes and leave these resources underused.

Another potential problem occurs when an educational landscape project is the product or vision of only one individual within the school community. Whether it is an ambitious volunteer parent or gifted teacher, that individual takes responsibility for designing, building, and maintaining the project for the entire school. In time, as one might expect, such situations often end in frustration or burnout due to lack of support. The long-term welfare of these resources is further threatened when the parent or teacher who created the landscape departs, leaving the school with no one to take over their responsibilities.

The following suggestions may better insure the viability of educational landscapes over time and maximize their integration into the school's culture and pedagogy.

Establishing Broad-Based Community Support

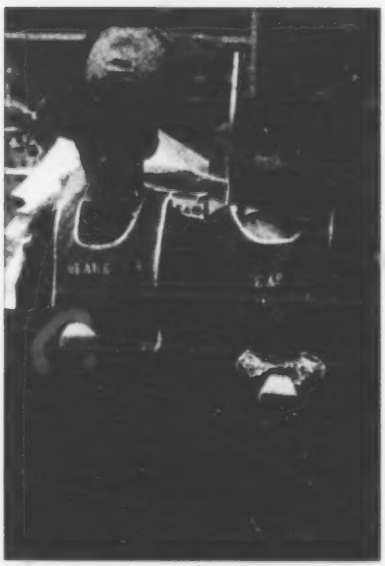
One of the most important steps a school can take to support an educational landscape is to solicit the full support of the entire school community. The engagement of teachers, administration, students, parents, and school board insures that the life of an educational landscape project will extend beyond the participation of any single

individual. The backing of the school's principal is key for encouraging a school-wide culture that values the grounds and for assuring continuing financing for the garden's development.

61.

One way to firmly establish a school grounds program is to create a part-time or full-time position to attend to the needs of the grounds. Some schools, like the LeConte Elementary School described earlier in this booklet, have hired a part-time garden manager to officially oversee the grounds and develop teaching programs with the teachers. In other cases, an individual in the administration has been designated to manage the grounds as a part of his or her duties. These individuals can be made responsible for scheduling and overseeing the garden's use, developing an annual maintenance plan, and planning new projects.

The Swarthmore Rutledge Elementary School, whose educational landscape master plan was highlighted earlier, has created its own Habitat Advisory Committee. Meeting regularly each month to implement garden projects and develop funding strategies, the Committee is made up of the principal, a teacher representative from each grade, parents, and representatives from after-school programs, the school safety committee, and outside community groups. This broad representation of the entire community is one way to ensure that the grounds program continues to play a role in the long term culture of that school.



62.

Part of increasing support for a school landscape means involving students. After-school ecology and gardening clubs are a natural adjunct to a well-developed school landscape. Students are proud of "their" tree that they planted and maintained on the grounds as part of an Adopt-A-Tree program (61). Stewardship of the grounds can also be fostered through school-wide activities that encourage children to pick up trash and adopt areas of the grounds to maintain. Clubs and programs instill a school-wide culture of caring. Children become invested in their school grounds, feel empowered by their work, and gain a sense of stewardship for their surrounding environments (62).

Facilitating Easy Use of the Educational Landscape

The existence of a teaching landscape does not necessarily guarantee its use. Without the support of the school administration to foster teacher commitment and use of the grounds, these resources can go underutilized. Schools can and should offer training and support sessions on the value and use of their on-site landscape resources.

A host of gardening activity manuals and curricula compiled by independent educational companies are available to guide and support teachers in the use of landscapes. Organizations, such as the Life Lab at the University of California at Santa Cruz, have developed extensive plant-based curricula with support materials and guidebooks on outdoor gardening with children. Curriculum guides for teaching geography, mathematics, language arts, and sciences by using the grounds have also been created by organizations like Learning through Landscapes, a non-profit English agency. These teaching guides, some of which are listed in the Appendix, outline a range of very specific outdoor teaching activities that expand classroom learning in prepared and tested formats. In several cases, schools with educational landscape programs have developed their own teaching manuals. Tailored to their individual situations, these guides relate to particular climatic conditions, sites, and staffing arrangements.

63.

64.

Lastly, the use of school grounds can be facilitated by supportive scheduling. Many teachers express the opinion that teaching away from the classroom is inhibited by traditional class period scheduling based on short, fifty-minute sessions that are not long enough to allow for leaving the building. Alternatives such as block scheduling offer longer and more flexible teaching periods that facilitate going outdoors.

65.

66.

67.

Conclusion

The vision of an educational landscape calls for nothing short of a complete and total re-valuing and re-programming of school grounds. It would be inexcusable to design the interior of a school with spaces that are not supportive of a defined teaching mission. It would also be unthinkable to create a school building without accommodating and fun places that engender and enhance learning.

The argument for making the outdoors part of every student's daily school experience is compelling. As our daily lives become more distant from the land and cycles of the seasons, and as computers substitute "virtual" for authentic experiences, it is imperative to re-engage students with hands-on activities that are fun, productive, and direct. Schools can and should take the lead in empowering children as future stewards of the earth. They can fulfill this important responsibility through the development and implementation of a thoughtful educational landscape philosophy. Carefully planned educational landscapes should confirm future generations' active and interdependent relationship with their environment.

Appendix

Appendix A: SOL Opportunities Related to the School Grounds

School grounds can support the teaching of many of Virginia's requirements at all grade levels. The following is a list of standards, taken from the four core subject areas of the Virginia Standards of Learning, whose content and concepts can be presented, reinforced, or investigated using school sites.

I. Mathematics Standards of Learning

In addition to the standards listed below are many other opportunities to enhance mathematics instruction. The SOLS make numerous references to using "concrete items" or "sets of items" in teaching quantitative concepts and relationships (weight, length, magnitude, pattern). The school grounds is a rich treasure trove of such "items" that can be used to teach quantitative concepts, and in doing so, make important connections between math and sciences curricula.

Kindergarten

K.16 gather data relating to familiar experiences by counting and tallying.

K.20 identify, describe, and extend a repeating relationship (pattern) found in common objects, sounds, and movements.

Grade One

1.15 describe the proximity of objects in space (near, far, close by, below, up, down, beside, and next to).

1.17 identify and describe objects in his/her environment that depict geometric figures: triangle, rectangle, square, and circle.

1.18 investigate, identify, and describe various forms of data collection in his/her world (e.g. recording daily temperature, lunch count, attendance, and favorite ice cream).

1.20 sort and classify concrete objects according to one or more attributes, including color, size, shape, and thickness.

1.21 student will recognize, describe, extend, and create a wide variety of patterns, including rhythmic, color, shape, and numeric. Patterns will include both growing and repeating patterns.

Grade Three

3.14 estimate and then use actual measuring devices with metric and U.S. customary units to measure length - inches, feet, yards, meters.

3.17 read temperature, to the nearest degree, from a Celsius thermometer and the Fahrenheit thermometer.

Grade Four

4.12 estimate and measure length using actual measuring devices and describe the results in metric and U.S. Customary units (inches, feet, yards, meters) and estimate the conversion of inches and centimeters, yards and meters...

4.14 identify and describe situations representing the use of perimeter and will use measuring devices to find perimeter in both standard and non-standard units of measure.

II. Science Standards of Learning

The school grounds is a goldmine for conducting first-hand investigations of the physical properties, processes, and inter-relationships of common materials, objects, and living organisms. The SOLS stress the teaching of sciences through understanding by investigation. As the living laboratory component for schools, school grounds greatly expand options to conduct first-hand scientific investigations and help students understand through direct experience the connection of scientific concepts to everyday experiences and places.

Kindergarten

K.1 conduct investigations in which basic properties of objects are identified by direct observation; observations are made from multiple positions to achieve different perspectives; etc.

K.2 investigate and understand that humans have senses including sight, smell, hearing, touch, and taste. Key concepts include five senses, sensory organs associated with each of the senses and sensory descriptors.

K.5 investigate and understand that water has properties that can be observed and tested. Key concepts include water occurs in different forms, the natural flow of water is downhill and some materials float in water while others sink.

K.6 investigate and understand basic needs and life processes of plants and animals. Key concepts include living things change as they grow and need food, water, and air to survive; plants and animals live and die (go through a life cycle) and offspring of plants and animals are similar but not identical to their parents and one another.

K.7 investigate and understand that shadows occur when light is blocked by an object. Key concepts include shadows occur in nature when sunlight is blocked by an object and shadows can be produced by blocking artificial light sources.
K.8 investigate and understand simple patterns in daily life. Key concepts include weather observations; the shapes and forms of many common natural objects including seeds, cones, and leaves; animal and plant growth.
K.9 investigate and understand that change occurs over time, and rates may be fast or slow. Key concepts include: natural and human-made things may change over time and changes can be noted and measured.
K. 10 investigate and understand that materials can be reused, recycled, and conserved. Key concepts include identifying materials and objects that can be used over and over again; describing everyday materials that can be recycled; and explaining how to conserve water and energy at home and in school.

Grade One

1.2 investigate and understand that moving objects exhibit different kinds of motion. Key concepts include the motion of objects may be observed in toys and in playground activities.
1.4 investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics. Key concepts include needs (food, air, water, light and a place to grow), parts (seeds, roots, stems, leaves, blossom, fruit), and characteristics (edible/nonedible flowering/non-flowering, evergreen/deciduous).
1.5 investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics. Key concepts include life needs (air, food, water and a suitable place to live); physical characteristics (body coverings, body shape, appendages, and methods of movements); and characteristics (wild/tame, water homes/land homes).
1.6 investigate and understand the basic relationships between the sun and the Earth. Key concepts include the sun is the source of heat and light that warms the land, air, and water; and night and day are caused by the rotation of the Earth.

1.7 investigate and understand the relationship of seasonal change and weather to the activities and life processes of plants and animals. Key concepts include how temperature, light, and precipitation bring about changes in plants, animals and people.
1.8 investigate and understand that natural resources are limited. Key concepts include identification of natural resources (plants and animals, water, air, land, minerals, forests, and soil); factors that affect air and water quality; recycling, reusing, and reducing consumption of natural resources; and use of land as parks and recreational facilities.

Grade Two

2.1 plan and conduct investigations in which observations are repeated to improve accuracy; linear, volume, mass, and temperature measurements are made in metric...and standard English units;
2.2 investigate and understand that natural and artificial magnets have certain characteristics. Important applications include the magnetic compass.
2.3 investigate and understand basic properties of solids, liquids, and gases. Key concepts include processes involved with changes in matter from one state to another (condensation, evaporation, melting, freezing, expanding, and contracting).
2.4 investigate and understand that plants and animals go through a series of orderly changes in their life cycles. Key concepts include: some animals go through distinct stages during their lives while others generally resemble their parents; and flowering plants undergo many changes from the formation of the flower to the development of the fruit.
2.5 investigate and understand that living things are part of a system. Key concepts include living organisms are interdependent with their living and nonliving surroundings; and habitats change over time due to many influences.
2.6 investigate and understand basic types and patterns of weather. Key concepts include temperature, wind, condensation, precipitation, drought, flood, and storms; and the uses and importance of measuring and recording weather data.
2.7 investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include

effects on growth and behavior of living things (migration, estivation, hibernation, camouflage, adaptation, dormancy); and weathering and erosion of the land surface.

2.8 investigate and understand that plants produce oxygen and food, are a source of useful products (fiber, cotton, oil, spices, lumber, rubber, medicines, and paper); the availability of plant products affects the development of a geographic area; and plants provide homes and food for many animals and prevent soil from washing away.

Grade Three

3.1 plan and conduct investigations in which predictions and observations are made; data are gathered, charted, and graphed; natural events are sequenced chronologically, temperature is measured to the nearest degree Celsius...

3.2 investigate and understand simple machines and their uses. Key concepts include types of simple machines; how simple machines function; and examples of simple machines found in the school.

3.4 investigate and understand that behavioral and physical adaptations allow animals to respond to life needs. Key concepts include methods of gathering and storing food, finding shelter, defending themselves, and rearing young; and hibernation, migration, camouflage, mimicry, instinct and learned behavior.

3.5 investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include producer, consumer, decomposer; herbivore, carnivore, omnivore; and predator, prey.

3.6 investigate and understand that environments support a diversity of plants and animals that share limited resources. Key concepts include water-related environments (pond, marshland, swamp, stream, river and ocean environments); dry-land environments (desert, grassland, rainforest, and forest environments), and population and community.

3.7 investigate and understand the major components of soil, its origin, and importance to plants and animals including humans. Key concepts include: soil provides the support and nutrients necessary for plant growth; topsoil is a natural product of subsoil and bedrock; rock, clay, silt, sand, and humus are components of soils and soil is a natural resource and should be conserved.

3.8 investigate and understand basic sequences and cycles occurring in nature. Key concepts include sequences of natural event (day and night, seasonal changes, phases of the moon, and tides); and animal and plant life cycles.
3.9 investigate and understand the water cycle and its relationship to life on Earth. Key concepts include the origin of energy that drives the water cycles; processes involved in the water cycle (evaporation, condensation, precipitation); and water supply and water conservation.
3.10 investigate and understand that natural events and human influences can affect the survival of species. Key concepts include the interdependency of plants and animals; human effects on the quality of air, water, and habitat; the effects of fire, flood, disease, erosion, earthquake, and volcanic eruption on organisms; and conservation, resource renewal, habitat management, and species monitoring.
3.11 investigate and understand different sources of energy. Key concepts include the sun's ability to produce light and heat energy; natural forms of energy (sunlight, water, wind); fossil fuels (coal, oil, natural gas) and wood; electricity, nuclear power, and renewable and non-renewable resources.

Grade Four

4.1 plan and conduct investigations in which distinctions are made among observations, conclusions (inferences), and predictions; data are classified to create frequency distribution; appropriate instruments are selected to measure linear distance, volume, mass, and temperature; predictions are made based on data; hypotheses are formulated based on cause and effect relationships.
4.4 investigate and understand basic plant anatomy and life processes. Key concepts include the structure of typical plants (leaves, stems, roots, and flowers); processes and structures involved with reproduction (pollination, stamen, pistil, sepal, embryo, spore, and seed): photosynthesis (chlorophyll, carbon dioxide); and dormancy.
4.5 investigate and understand how plants and animals in an ecosystem interact with one another and the nonliving environment. Key concepts include behavioral and structural adaptations; organizations of communities; flow of energy through food webs; habitats and

niches; life cycles; and influence of human activity on ecosystems.
4.6 investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include weather factors (temperature, air pressure, fronts, formation and type of clouds, and storms); and meteorological tools (barometer, hygrometer, anemometer, rain gauge, and thermometer).
4.7 investigate and understand the relationships among the Earth, moon, and sun. Key concepts include the motions of the Earth, moon, and sun (revolutions and rotation); the causes for the Earth's seasons and phases of the moon; the relative size, position, and makeup of the Earth, moon, and sun; unique properties of the Earth as a planet and as part of the solar system...
4.8 investigate and understand important Virginia natural resources. Key concepts include watershed and water resources; animals and plants, both domesticated and wild; minerals, rocks, ores, and energy sources; and forests, soil, and land.

Grade Five

5.1 plan and conduct investigations in which appropriate instruments are selected and used for making quantitative observations of length, mass, volume, and elapsed time; rocks, minerals, and organisms are identified using a classification key; data are collected, recorded, and reported...; accurate measurements are made using basic tools, (e.g. thermometer, meter stick); predictions are made using patterns...; and estimations of length, mass, and volume are made.
5.7 investigate and understand how the Earth's surface is constantly changing. Key concepts include the rock cycle including the identification of rock types; weathering and erosion; and human impact.

Grade Six

6.1 plan and conduct investigations in which observations are made involving fine discrimination between similar objects and organisms;... data are collected, recorded, analyzed, and reported using appropriate metric measurement
6.3 investigate and understand sources of energy and their transformations. Key concepts include energy sources (fossil fuels, wood, wind, water, solar power)
6.7 investigate and understand that matter has physical and chemical

properties and can undergo change. Key concepts include physical changes; and changes in chemical composition, including oxidation reactions (rusting and burning) and photosynthesis

6.8 investigate and understand that organisms perform life processes that are essential for survival and perpetuation of the species. Key concepts include energy transformation (from food or photosynthesis) and respiration, movement, waste removal, growth, irritability (response) and reproduction.

6.9 investigate and understand organisms depend on other organisms and nonliving components of the environment. Key concepts include producers, consumers, and decomposers; food webs and food pyramids; and cycles (water, carbon dioxide/oxygen, nitrogen).

Life Science

LS.4 investigate and understand that the basic needs of organisms must be met in order to carry out life processes. Key concepts include plant needs (light and energy sources, water, gases, nutrients), animal needs (food, water gases, shelter, space); and factors that influence life processes.

LS.6 investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plants and animal life. Key concepts include energy transfer between sunlight and chlorophyll; transformation of water and carbon dioxide into sugar, water, and oxygen; and photosynthesis as the foundation of food webs.

LS.7 investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include interactions resulting in a flow of energy and matter throughout the system; complex relationships in terrestrial, freshwater, and marine ecosystems; and energy flow in food chains, food webs, and food pyramids.

LS.9 investigate and understand that interactions exist among populations in a biological community. Key concepts include relationship among producers, consumers, and decomposers in food chains and food webs; relationship of predator and prey; competition and cooperation; symbiotic relationships and niches; and role of parasites and hosts.

LS.10 investigate and understand how organisms adapt to biotic and abiotic factors in a biome. Key concepts include differences between ecosystems and biomes; characteristics of land, marine, and freshwater biomes; and adaptations that enable organisms to survive within a specific biome.

LS.11 investigate and understand that ecosystems, communities, populations and organisms, are dynamic and change over time (daily, seasonal, and long term). Key concepts include phototropism, hibernation, and dormancy; factors that increase or decrease population size; eutrophication, climate change, and catastrophic disturbances.

LS.12 investigate and understand relationships between ecosystem dynamics and human activity. Key concepts include food production and harvest; change in habitat size, quality, and structure; change in species competition; population disturbances, and factors that threaten and enhance species survival; environmental issues (water supply, air quality, energy production, and waste management).

Earth Science

ES.3 investigate and understand how to read and interpret maps, globes, models, charts, and imagery. Key concepts include maps (geologic, topographic, and weather) and star charts; imagery (aerial photography and satellite images); direction and distance measurements on any map or globe; and location by latitude and longitude and topographic profiles.

ES.5 investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. Key concepts include properties including hardness, color and streak, luster, cleavage, fracture, and unique properties; and uses of minerals.

ES.6 investigate and understand how to identify common rock types based on mineral composition and textures and the rock cycle as it relates to the transformation of rock types. Key concepts include igneous, sedimentary and metamorphic rocks.

ES.9 investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans.

ES.13 investigate and understand that energy transfer between the sun, Earth, and the Earth's atmosphere drives weather and climate

on Earth. Key concepts include observation and collection of weather data; prediction of weather patterns; and weather phenomena and the factors that affect climate.

Biology

BIO.1 plan and conduct investigations in which observations of living things are recorded in the lab and the field; hypotheses are formulated based on observations; appropriate technology is used for gathering and analyzing data

BIO.5 investigate and understand life functions of monerans, protists, fungi, plants and animals, including humans. Key concepts include observations of local organisms when applicable.

BIO. 7 investigate and understand bases for modern classification systems. Key concepts include structural similarities in organisms; comparison of developmental stages in different organisms; and examination of local flora and fauna where applicable.

BIO.9 investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include succession patterns in ecosystems; the effects of natural events and human influences on ecosystems; and analysis of local ecosystems.

III. English Standards of Learning

The school landscape provides an array of themes, experiences, and materials to draw upon in creative and descriptive writing exercises and development of a greater descriptive vocabulary.

K.11 draw pictures and /or use letters and phonetical-spelled words to write about experiences, stories, people, objects, or events.

1.12 use descriptive words when writing about people, places, things and events.

IV. History and Social Science Standards of Learning

In particular, school grounds provide a means to achieve the goals of geography instruction. Using the school grounds as a teaching lab for understanding the physical characteristics of earth's places and regions, addressing themes, of location, place, human environments, movement, and region. The ability to use and interpret maps, globes, and aerial imagery is another skill facilitated through an outdoor instructional program.

Kindergarten

K.2 compare and contrast the relative location of people, places, and things by locating land and water on a map using north, east, south, and west.

K.4 identify symbols such as community symbols (traffic signs, traffic lights, street and highway markers, etc. and map symbols (legend references to land, water, roads, and cities).

K. 7 demonstrate an understanding that being a good citizen involves important actions by taking responsibility for certain classroom *(or school grounds!)* chores.

Grade One

1.6 construct a simple map of a familiar area incorporating cardinal direction, scale, and map symbols.

1.7 describe how climate, location, and physical surroundings affect the way people live, including their food, clothing, shelter, transportation, and recreation.

Grade Four

4.2 use the concepts of absolute location (e.g. using grid systems) and relative location (e.g. direction, reference to water features) to locate and identify on maps and globes his/her local city or county...; and explain how physical characteristics, transportation routes, climate, and specialization influenced the variety of crops, products, and industries and the general patterns of economic growth in Virginia.

The following activity to build a straw bale and compost pile is one of a series of "learning experiences" developed by the East Haven, Connecticut School District. Note how, at the bottom, the applicable District Science Standards are referenced.

Learning Experience #5:
Build a straw bale / redworm compost pile

Goals and Objectives
To witness the changing state of organic matter and to gain an appreciation of composting as an important gardening practice that enriches the soil.
Students will:
- Collect straw bales
- Follow directions for a simple worm compost pile
- Maintain the compost pile and proper moisture levels
- Analyze the results
- Use the compost in gardening
- Conduct growing experiments using compost to verify if it increases production

Where It Happens
Near the school garden at any school

Materials Required
- Level place 3 x 3 feet
- Four straw bales
- Pitchfork
- Manure
- Soil
- Plastic tarp

Processes and Practices
Choose a level spot at least 3 x 3 feet. With a pitchfork, slightly loosen the soil underneath. Place straw bales on their sides to form the walls. First lay a course of brushy small branches and whole sunflower or cornstalks on the bottom in a 3-inch layer to help aeration. Then make 1-3 inch alternating layers of carbon-rich and nitrogen-rich matter. The smaller the pieces, the faster they break down. Layers of carbon-rich materials can be somewhat thicker than nitrogen-rich materials. Every few layers, sprinkle 1/4 inch of garden soil or homemade compost. After making a few layers, include a big handful of red worms and watch what happens. The straw bales insulate against winter cold and keep the pile from drying out in the summer. Place a thick layer of straw on top and don't forget a tarp. Add kitchen scraps every few days and keep other layering materials nearby covered in winter so they won't freeze. Keep the pile moist. As the pile "cures", it shrinks. After about six months, move aside one of the straw bale walls and see if the compost is ready.

Time Required
1 - 2 hours

District Science Standards Addressed
H2a, H3b, H4b, H7b

Appendix C: Students' Wish Lists for their School Grounds

The following two wish lists of activities were elicited from school communities as they began the design process to develop their school grounds. The lists suggest a diversity of places and elements for any school grounds for physical activities, for rest and quiet, for imaginative play, as well as for nature studies.

Wish List from the Children, Parents and Teachers of the Graze Brook Primary School in London:

- Bird feeder
- Climbing frame
- Shady cave
- Butterfly tunnel or house
- Dream house
- Peaceful place
- Play huts
- Shelter for shade
- A better stage
- Bike shed or racks
- Maze
- Tree house
- Monkey bar
- Slide
- A machine of a dinosaur
- Big slide with balls at the bottom
- Quiet area
- Sitting area
- Reading area
- More color in the infant playground
- Bird boxes for nesting
- Pebble mosaic set in mortar
- Rock garden
- Animal carved tables
- Hideout
- Water fountains
- Arcades
- Swings
- More climbing facilities and tunnels
- Gigantic rocks to play on
- More flowers
- Table tennis
- Climbing tree that is safe
- A few flowers around a tree
- More toys to play with in the quiet area
- A grass area with mini beasts
- A bird house
- More benches to sit on when you are hot or ill
- A place for planting things of your own
- Willow coppice
- Stepping stones near offices
- Pergola outside the classroom
- An orchard

Wish List from the Teachers of the Princeton Junior School in Princeton, New Jersey:

- A sundial (upright or on the ground)
- Evergreens surrounded by summer corn
- United States Flag and or school flag
- A "Circle of Life" - Native American
- Monthly or seasonal "mannequin" (scarecrow, pumpkin figures, snowman, ice sculptures)

- Place which attracts humming birds and butterflies
- Small orchard for harvesting and cooking
- Children plant, prune, wait/watch, harvest, cook cider, applesauce, etc.
- Bunny habitat
- Small domestic animals
- Aviary
- Vegetable garden
- Wild flowers and a Flower garden
- Ponds
- Notable trees in playgrounds - maples (leaves), cherry (flowers)
- Blacktop or other firm ground-cover play area within reach of classrooms, for basketball, games, rollerblading, hopscotch, etc. perhaps a path upon which children could ride. A roll would be more in keeping with landscaping.
- Amphitheatre
- Grape arbor with benches and reading space
- Sand pits (away from school)
- Equipment close to school for short term play: jungle-gym, swings, climbers
- Weather station or place from which to observe sky, weather, wind
- Storytelling circles
- Pathway all around school grounds - textured, varied, winding in and out with variety of experiences
- Picnic areas
- Spaces away from school crowd for quiet reflection, music, reading, games
- Labyrinth, maze, spiral in lawn
- Soccer field
- Teacher-friendly play yards
- Play house
- Hill for sledding
- Water fountain
- Children's hand prints in pavement outside of outer classroom doors or walkways
- Something stable like haystacks in a field by which to measure or observe the passage of time
- Berms and changing levels in playgrounds
- Space alongside building for bulbs, flowers, stones, fountains
- Fencing for lower school play area
- Shed to hold play equipment
- Nooks and crannies

References and Resources

Organizations

1. **Learning Through Landscapes**. Through its host of publications, sponsored research, workshops and seminars, this non-profit organization has pioneered the movement worldwide to upgrade school grounds. Since 1987, this agency has been involved with thousands of schools in England to transform barren asphalt play yards into quality teaching school grounds. They have produced a host of activity guides and resources for outdoor teaching for use with most curriculum guides. Journal articles about this organization and books and resources are listed below.

Mailing Address:	Third Floor, Southside Offices, The Law Courts, Winchester, Hampshire SO 23 9DL
Internet Address:	www.ltl.org.uk
Telephone:	01962 846258

2. **National Wildlife Federation.** This Virginia-based organization has a program called the Schoolyard Habitats Project whose goal is to link habitat and wildlife conservation goals on school grounds with the creation of teaching resources. Participating schools are re-certified annually, and connected into a national network of other schools which have undertaken habitat enrichment projects. Their newsletter "Habitats" provides updates on resource materials, funding ideas, habitat concerns, and maintenance tips, and new habitat education ideas.

Mailing Address:	8925 Leesburg Pike Vienna, Virginia 22184-0001
Internet Address:	www.nwf.org/nwf/ prog/habitats
E-Mail Address:	griffen@nwf.org
Telephone:	703.790.4582

3. **The Evergreen Foundation.** Located in Vancouver, British Columbia and Toronto, Ontario, this organization is the Canadian equivalent of the British "Learning Through Landscapes Trust." Funded by government and private contributions since 1991, it has created the "Learning Grounds" program which conducts workshops and provides resources to school communities to assist in transforming their school grounds into healthy and dynamic learning naturalized environments. It also funds start-up grants to schools for projects. Their newsletter is called "The Outdoor Classroom."

Mailing Address:	106-163 West Hastings Street Vancouver, British Columbia V6B 1H6
Internet Address:	www.evergreen.ca
E-Mail Address:	infobc@evergreen.ca
Telephone:	604.689.0766
Fax:	604-689.0768

4. **Landscapes for Learning.** Based at Clemson University, Landscapes for Learning Collaborative is a multi-agency service network in a partnership between Clemson Department of Sociology, Public Service and Agriculture, and South Carolina Botanical Garden. Their activities promote stewardship, environmental education, gardening related activities and curricula. Their newsletter is called "Landscapes for Learning."

Mailing Address:	Dept. of Sociology, 2123 Brackett Hall Box 341513, Clemson University Clemson, South Carolina 29634-1513
E-Mail Address:	psaulni@Clemson.edu or vanmey@Clemson.edu
Telephone:	864.656.7988

5. **Model Inquiry into Nature in the Schoolyard Program (MINTS)** at the Virginia Museum of Natural History, Blacksburg Virginia (a branch of the Virginia Museum of Natural History). This five-year project, funded by the Howard Hughes Medical Institute, promotes Virginia schoolyards as laboratories through teacher training workshops and their *MINTS Book*, an inquiry-based guide on the natural history of local schoolyards. The book explores the plants, animals and other features found in common school surroundings -- parking lots, lawns, fencerows, buildings, and trees -- and provides inquiry-based teaching methods and activities for guiding students through science lessons.

Agency Contact:	S. Llyn Sharp, Project Coordinator and Museum Education Curator
Mailing Address:	428 North Main Street Blacksburg, Virginia 24061-0542
Internet Address:	Underway
E-Mail Address:	llyn@vt.edu
Telephone:	540.231.4080
Fax:	540.231.5446

6. **Environmental Education Center (EEC).** This Virginia-based organization works through the local schools to foster a community's understanding of its region's natural heritage. Their Schoolyard Habitat Project helps schools to establish on-grounds habitats and assist teachers in grades K-8 in using these habitats to enhance their teaching. Their current project involves fifteen Charlottesville / Albemarle schools, whose grounds will be assessed for their instructional potential and partnered together in an area-wide network of school grounds that can be utilized through field trips by other school communities.

Agency Contact:	John Hermsmeier, Programs Director
Mailing Address:	1108 East High Street Charlottesville, Virginia 22902
Internet Address:	http://avenue.gen.va.us/Community/Environ/EnvironEdCenter
E-Mail Address:	atrank@virginia.edu (Andrea Trank, Director)
Telephone:	804.923.3792

7. **Schoolyard Ecology for Elementary School Teachers (SYEFEST).** In its mission to foster ecological literacy through schoolyard ecology, SYEFEST programs help teachers develop skills for teaching through the outside. They advocate a teaching methodology that is directed by children's own natural inquiry and questions. Their newsletter is called "Schoolyard Ecology News."

Mailing Address:	SYEFEST, The Institute of Ecosystem Studies, Box R Millbrook, New York 12545
E-Mail Address:	BerkowitzA@ecostudies.org
Telephone:	914.677.5358

8. **American Horticultural Society (AHS).** Founded in 1922, AHS is an educational, non-profit organization whose mission is to educate people to become successful and environmentally responsible gardeners by advancing the art and science of horticulture. Their educational programs and dissemination of horticultural information are well-known and highly regarded.

Mailing Address:	7931 East Boulevard Drive Alexandria, Virginia 22308
Internet Address:	www.ahs.org
Telephone:	703.768.5700
Fax:	703.768.8700

9. **Project Learning Tree.** An environmental education program designed for grade K-12 educators. Since 1973, PLT uses the forest as a "window" into natural and built environments to help students gain an awareness and knowledge of their environment. PLT has developed a teaching curriculum and training workshops for educators.

Mailing Address:	1111 Nineteenth Street N.W. Suite 780 Washington D.C. 20036
Internet Address:	www.plt.org
E-Mail Address:	info@affoundation.org
Telephone:	202.463.2462
Fax:	202.463.2461

10. The Green Brick Road. A commercial distributor of resource materials dealing in environmental education and school ground naturalization.

Mailing Address:	c/o 8 Dumas Court, Don Mills Ontario, Canada M3A 2N2
Internet Address:	http://gbr.org
Telephone:	800.473.3638
Fax:	416.537.7515

11. Life Lab Science Program. Developed in the late 1970's in affiliation with University of California at Santa Cruz, the Life Lab curriculum investigates mandated science concepts through hands-on gardening experiences for school children. Professional development for educators and resource books and guides are offered.

Mailing Address:	1156 High Street Santa Cruz, California 95064
Internet Address:	http://lifelab.ucsc.edu
E-Mail Address:	lifelab@zzyx.ucsc.edu
Telephone:	408.459.2001

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